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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/593,096

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Sajad Haq

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BUCHANAN, INGERSOLL & ROONEY PC
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EXAMINER

MASKELL, MICHAEL P

ART UNIT

PAPER NUMBER

2881

NOTIFICATION DATE

DELIVERY MODE

09/23/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/593,096	Applicant(s) HAQ ET AL.	
	Examiner MICHAEL MASKELL	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-10,13-20 and 22-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-10,13-20 and 22-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/16/2009 has been entered.

Claim Objections

2. The cancellation of claim 21 obviates the objection of claim 21.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-8, 10 and 22-25 rejected under 35 U.S.C. 102(b) as being anticipated by Sussmann (EP 0440384 A1, cited in IDS, copy present in IFW).

Regarding claim 1, Sussman discloses a radiator comprising a substrate (abstract), an amorphous carbon layer (column 3, lines 17-18) formed on a radiating surface of the substrate (due to blackbody radiation, any surface of a heat sink is a radiating surface after heat has been absorbed) and a metallic carbide layer interposed between the substrate and amorphous carbon layer and a protective layer formed on

the amorphous carbon layer (abstract).

Regarding claim 2, Sussman discloses wherein the metallic carbide-forming carbide layer comprises titanium (column 2, line 13).

Regarding claim 3, Sussman discloses wherein the amorphous carbon layer and/or the carbide layer has a thickness in the range of 0.1 micrometers to 1.0 micrometers (column 2, lines 42-44).

Regarding claims 5 and 6, Sussman discloses wherein the amorphous carbon layer is protected by a protective layer comprising at least one of SiC, SiO₂, diamond and diamond-like carbon (abstract), and wherein the protective layer is transparent to infrared radiation (diamond is transparent to infrared radiation).

Regarding claim 7, Sussman discloses a method of making a radiator having an emissivity of at least 30% for radiation of wavelength in the range of 3 micrometers to 5 micrometers (see above, the protective layer is transparent to infrared radiation) comprising the steps of providing a substrate having a radiating surface (see in re claim 1 above) forming a metallic carbide-forming layer on the radiating surface (abstract) and forming an amorphous carbon layer on the metallic carbide-forming layer (column 3, lines 17-18) and forming a protective layer on the amorphous carbon layer (abstract).

Regarding claim 8, Sussman discloses wherein the amorphous carbon layer and/or the metallic carbide forming layer is formed by sputter deposition or evaporation (abstract; column 3, lines 15-23).

Regarding claim 10, Sussman discloses wherein the radiator is annealed after the steps of forming the metallic carbide-forming and amorphous carbon layers (column

Art Unit: 2881

2, lines 24-32).

Regarding claims 23 and 24, Sussman discloses wherein the radiator is annealed after the steps of forming the metallic carbide-forming and amorphous carbon layers.

Regarding claim 25 Sussman discloses the claimed arrangement of layers, which the applicant's specification admits inherently produces an emissivity of at least 30% for radiation of wavelength in the range of 3 micrometers to 5 micrometers.

5. Claims 1-5, 6-8, 13, 14, 16, 17, 18, 20, 22 and 25 rejected under 35 U.S.C. 102(b) as being anticipated by Blangetti (U.S. Patent Application Publication 2004/0069466 A1).

6. **Regarding claim 1**, Blangetti discloses a radiator comprising a substrate, an amorphous carbon layer formed on a radiating surface of the substrate (Abstract) and a metallic carbide layer interposed between the substrate and the amorphous carbon layer (paragraph 0028) and a protective layer formed on the amorphous carbon layer (abstract).

7. **Regarding claim 2**, Blangetti discloses wherein the metallic carbide layer comprises titanium (paragraph 0028).

8. **Regarding claim 3**, Blangetti discloses wherein the amorphous carbon layer and/or the titanium layer has a thickness in the range of 0.1 micrometers to 1.0 micrometers (claim 4).

9. **Regarding claim 5**, soft amorphous carbon as disclosed by Blangetti is substantially transparent to infrared radiation.

Art Unit: 2881

10. **Regarding claim 6**, Blangetti discloses wherein the protective layer comprises diamond-like carbon (paragraph 0012).

11. **Claim 7** is the method of making the radiator of claim 1, and the same rejection is applicable *mutatis mutandis*. The applicant's disclosure shows that metallic and amorphous carbon layers provided as claimed (and as present in Blangetti) inherently creates a high emissivity (applicant's specification, p. 2).

12. **Regarding claim 8**, Blangetti discloses wherein the amorphous carbon layer and/or the metallic carbide forming layer is formed by sputter deposition or evaporation (paragraph 0025).

13. **Regarding claim 13**, Blangetti discloses a radiator comprising a substrate, a soft amorphous carbon layer formed on the substrate (Abstract) and a metallic carbide layer interposed between the substrate and the amorphous carbon layer wherein the metallic carbide layer is in contact with the amorphous carbon layer (paragraph 0028).

14. **Claim 16** is the method of making the radiator of claim 13, and the same rejection is applicable *mutatis mutandis*.

15. **Regarding claims 14 and 17**, the applicant's disclosure shows that metallic and amorphous carbon layers provided as claimed (and as present in Blangetti) inherently creates a high emissivity (applicant's specification, p. 2).

16. **Regarding claim 18**, Blangetti discloses wherein the metallic carbide-forming layer is provided on an integral surface layer of the substrate (paragraph 0028).

Art Unit: 2881

17. **Regarding claim 20**, Blangetti discloses wherein the amorphous carbon layer and/or the titanium layer has a thickness in the range of 0.1 micrometers to 1.0 micrometers (claim 4).

18. **Regarding claim 22**, Blangetti discloses wherein the amorphous carbon layer comprises titanium (paragraph 0028).

Regarding claim 25, the applicant's disclosure shows that metallic and amorphous carbon layers provided as claimed (and as present in Blangetti) inherently creates a high emissivity (applicant's specification, p. 2).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 13, 14, 16, 17, 19 and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Sussman in view of Blangetti, et al (U.S. Patent Application Publication 2004/0069466 A1).

21. **Regarding claim 13**, Sussman discloses a radiator comprising a substrate (abstract), an amorphous carbon layer (column 3, lines 17-18) and a metallic carbide-forming layer interposed between the substrate and amorphous carbon layer (abstract).

The applicant has argued that Sussman's amorphous carbon layer is not "soft." Without conceding this point, the addition of a soft amorphous carbon layer on top of a

Art Unit: 2881

hard amorphous carbon layer is rendered obvious when Sussman is taken in view of Blangetti.

Blangetti discloses a heat sink comprising a substrate coated with a hard amorphous carbon layer and then a soft amorphous carbon layer on top of the hard one. Blangetti teaches that this arrangement allows for dropwise condensation and protects from impingement erosion (Abstract). By simply adding a soft amorphous carbon layer on top of Sussman's ostensibly hard amorphous carbon layer, one of ordinary skill in the art would be able to easily gain the advantages taught by Blangetti. It would therefore have been obvious to one of ordinary skill in the art to add a soft amorphous carbon layer on top of Sussman's amorphous carbon layer, resulting in the claimed configuration.

22. **Claim 16** is the method of making the radiator of claim 13, and the same rejection is applicable *mutatis mutandis*.

23. **Regarding claims 14 and 17**, Sussman discloses use as a heat sink as one application, which is a high emissivity radiator. Further, the applicant's disclosure shows that metallic and amorphous carbon layers provided as claimed (and as present in the obvious combination) inherently creates a high emissivity (applicant's specification, p. 2). Note that the attainment of this high emissivity is not the reason for combining the references in the rejection of claim 13, and so no hindsight is used in the combination.

Art Unit: 2881

24. **Regarding claim 19**, Sussman discloses wherein the metallic carbide forming layer is provided as a separate layer on a surface of the substrate (column 1, lines 40-49).

25. **Regarding claim 20**, Sussman discloses the radiator of claim 2, but fails to teach wherein the amorphous carbon layer and/or the titanium layer has a thickness in the range of 0.1 micrometers to 1.0 micrometers; however, the soft amorphous carbon layer that Blangetti shows to be obvious to apply to Sussman's radiator in re claim 13 above has a thickness in said range (claim 4 of Blangetti).

Response to Arguments

26. Applicant's arguments filed 07/16/2009 have been fully considered but they are not persuasive.

Regarding the Sussman patent, the applicant has argued that Sussman does not disclose or suggest that an amorphous carbon layer is formed on a radiating surface of the substrate. As described in the grounds of rejection state above, any heat sink radiates due to blackbody radiation from all surfaces when application of heat to the heat sink is stopped. Thus, no matter what surface the layers are applied to, said surface is a "radiating surface" under appropriate conditions. The applicant has also argued that Sussman discloses applying a protective layer between the diamond-like carbon layer and the substrate, and not on top of the amorphous carbon layer as required by claim 1; however, what Sussman refers to as a "protective layer" is actually the amorphous carbon layer itself (see claim 6 and column 3 lines 5-22). The diamond-like carbon layer is deposited on top of the amorphous carbon layer, and thus may be

Art Unit: 2881

considered "a protective layer formed on the amorphous carbon layer."

Regarding the Blangetti reference, the applicant has submitted a proposed interpretation of the word "soft" in claims 13 and 16 as meaning able to be scratched with a pair of tweezers, and further elaborates this meaning in terms of the Vickers hardness scale. The applicant's specification describes a sputtering process that results in an amorphous carbon film "that is soft and can easily be scratched with a pair of tweezers" (p.5-6 of the specification). This does not, however, amount to a definition of "soft" as specifically being soft enough to be easily scratched by a pair of tweezers; rather, it describes a particular degree of softness that exists within the range of "soft" (hence a film "that is soft **and** can easily be scratched with a pair of tweezers," emphasis added). Simply using the word "soft" in the claims encompasses a broad range of degrees of "softness," within which the level of softness that can be scratched by tweezers exists. Blangetti explicitly uses the exact same word "soft" as the present claims throughout the reference, and while specific degrees of softness are described in Blangetti that are certainly too hard to scratch with tweezers, the word "soft" alone in the claims is too broad to distinguish over the reference.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL MASKELL whose telephone number is (571)270-3210. The examiner can normally be reached on Monday-Friday 8AM-5PM EST.

Art Unit: 2881

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571/272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael Maskell/
Examiner, Art Unit 2881
17 September 2009
/ROBERT KIM/

Supervisory Patent Examiner, Art Unit 2881